Tachograph programmer CD400

User manual

Software version V2.00 r07

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1 Introduction

1.1 What is a tachograph?

Basically, a tachograph is a device that measures and records the speed and distance driven by a vehicle.

The data are recorded in the form of graphics on a paper disk.
The new digital tachographs record those data on its embedded memory and also on the smartcard of the driver.

The tachograph measures the speed and driven distance of the vehicle using an electric signal coming from a sensor mounted on the gearbox.

You can find more information about tachographs on Wikipedia.

1.2 Tachograph calibration

Like any other measuring device, a tachograph needs to be calibrated, which means that it needs to be configured in order to measure with a minimum accuracy.

In the case of the tachograph, the parameter responsible for the calibration is called the K factor which represents the number of pulses that should be received by the tachograph when the vehicle drives a one kilometer distance.

The W factor is a characteristic of the vehicle and represents the number of pulses generated by the sensor on the gearbox when the vehicle drives a one kilometer distance.

The calibration consists in setting the K factor of the tachograph to the value of the W factor of the vehicle.

The most important function of the tachograph programmer CD400 is to measure the W factor of a vehicle and program that value a the K factor of the tachograph.

The CD400 also allows checking the proper operation of the tachograph and the programming of the parameters specific to each tachograph model.

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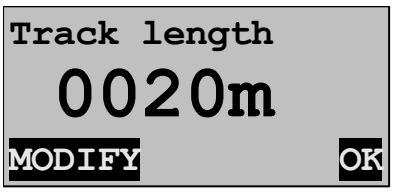
2 Description

2.1 Technical specifications

- Graphic FSTF LCD Display: 100 x 32 px (4 lines x 20 char)
- White LED backlight
- Size: 150 x 100 x 45 mm
- Supply voltage: 9 to 30 VDC
- Supply current: 12mA
- Case: green-blue ABS (IP40)
- Operating temp: -20…+70°C
- Weight: 155g

2.2 Display and Keyboard



- Alternate function keys 'F1', 'F2' & 'F3' are active when a function in inverted video appears on the bottom line of the display.

F1= MODIFY, F3=OK

- Alternate function key '↑' & '↓' are used for example to navigate the menus.

- Alternate function key '←' & '→' are used to select the digit in some parameters.

- 'Ent' (=Enter) is used to select a function or enter a value.

- 'Esc' key is used to go back in the menu, leave a function, to erase the last digit entered and to switch the programmer ON & OFF when powered by the battery.

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2.3 Connections

- Left connector:
Serial port for software upgrade (upgrade cable).

- Center connector:
Connection for crocodile clip cable (K1314/ K1318).

- Right connector:
Connection for tachograph cable.

3 Operation

3.1 Power supply and tachograph type detection

For all tachograph types, except for the K1314/1318 and the FTCO1319, the programmer is powered by the tachograph itself. An automatic tachograph type detection is executed on power ON, so don't switch the programmer ON, simply connect it to the tachograph with the appropriate cable. The programmer will switch ON and detect the tachograph type.

In the case of the K1314/1318 and the FTCO1319, switch the programmer ON pressing the 'I/O' key.
If the FTCO1319 is connected, the programmer will detect it.
To switch the programmer OFF, press and hold the 'I/O' key.

If no tachograph is detected, the K1314/1318 will be selected by default.

On power ON, the programmer will display the product information (Software version, Serial number, etc...), then the menu for the tachograph type detected.

3.2 Menu trees

The functions available in the main menu depend on tachograph model detected (or selected manually).
The tachograph model appears on the top line.

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3.2.1 KTCO 1314/1318

```
  KTCO 1314/1318

1.Measure W          1.Manual
                     2.Photo sensor

2.Measure K

3.Speed test         1.Manual
                     2.Automatic

4.Odometer test
5.Clock test
6.Select Tacho.
7.Product info.
8.Language.
```

3.2.2 MTCO 1324/1390

```
  MTCO 1324/1390

1.Measure W          1.Manual
                     2.Photo sensor

2.Parameters         1.K Factor
                     2.Odometer
                     3.Instal. Date
                     4.Calibr. Date
                     5.Time & Date
                     6.O/P shaft
                     7.Service delay
                     8.CAN priority
                     9.Binary code
                     10.Product Code
                     11.VIN
                     12.N-RPM Factor
                     13.L-Tyre
                     14.Serial number
                     15.Maximum speed (1390 only)

3.Speed test         1.Manual
                     2.Automatic

4.Odometer test
5.Erase DTCS
6.Sensor pairing
```

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```
7.Clock test
8.Select Tacho.
9.Product info.
10.Language.
```

3.2.3 Motomet.EGK100

```
  Motomet.EGK100
```

1.Measure W	1.Manual 2.Photo sensor
2.Parameters	1.K Factor 2.Kn 3.U1 4.U2 5.U3
3.Speed test	1.Manual 2.Automatic

```
4.Odometer test
5.Select Tacho.
6.Product info.
7.Language.
```

3.2.4 Kienzle 1319

```
  Kienzle 1319
```

1.Measure W	1.Manual 2.Photo sensor
2.Measure K	
3.Parameters	1.K factor 2.Odometer 3.Instal. Date 4.Calibr. Date 5.Odometer Unit 6.Speed Warning 7.Fitter Number 8.Clock Speed 9.Kn ON/OFF 10.Kn Max

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	11.Kn Warning 12.Code 13.Mercedes ID 14.EEC Tacho. 15.SWISS ABZ 16.Driver change 17.4imp/m output 18.Note 19.Service 20.Tot. distance 21.Model 22.Serial number 23.Electronics 24.Code SO 25.Code ME 26.Code PR
4.Speed test	1.Manual 2.Automatic

5.Odometer test
6.Clock test
7.Select Tacho.
8.Product info.
9.Language.

3.2.5 V.Root VR2400

V.Root VR2400

1.Measure W	1.Manual 2.Photo sensor
2.Parameters	1.K factor 2.Odometer 3.Pulse per rev. 4.Idle rpm 5.Economy rpm 6.Poor Econ. rpm 7.CANBus RPM 8.RPM Display 9.Dist displ.0s 10.DTCs Display 11.Overspd Flash 12.Overspeed 12.Time & Date 13.O/P shaft 14.4th Chart Tr

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		15.CANBus enable
		16.CAN Type
		17.Dual Axle
		18.D.Axle Ratio
		19.D6 pin funct.
		20.Speedo.OP fact
		21.Serial Comms
		22.Ignit.On rec.
		23.Driver 2 Duty
		24.Reset HeartBt
		25.Eject pin code
		26.Sensor type
		27.Service Delay
		28.Installat.date
		29.Calibrat. date
		30.Repair Shop ID
		31.Vehicle ID n°
3.Speed test	1.Manual	
	2.Automatic	
4.Odometer test		
5.Erase DTCS		
6.Sensor pairing		
7.Clock test		
8.Select Tacho.		
9.Product info.		
10.Language.		

3.2.6 Digital VDO

DIGITAL VDO

1.Measure W	1.Manual	
	2.Photo sensor	
2.Parameters	1.Calibration	1.W factor
		2.K factor
		3.L (Tyre Circ.)
		4.Tyre Size
		5.Max.Auth.Speed
		6.Odometer
		7.Time & Date
		8.Next Cal. Date
		9.Veh.Reg.Nation
		10.Veh.Reg.Number
		11.Veh.Id.Number
		12.O/P shaft

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2.Other param.	1.ResetHeartbeat 2.TCO1 priority 3.O/P shaft 4.CAN rep.rate 5.Part number
3.Manufacturer	1.Part number 2.Drv1 ign.ON 3.Drv2 ign.ON 4.Drv1 ign.OFF 5.Drv2 ign.OFF 6.D1D2 Record 7.RPM Record 8.Speed Record 9.Install. date 10.ResetHeartbeat 11.CAN error 12.CAN2 TC01 mess 13.CAN2 WakeUp D3 14.CAN2RemoteDown 15.RD interface 16.Speed Warning 17.Illum. Mode 18.IMS Activation 19.IMS Source 20.IMS Factor 21.VDO Counter
4.Information	1.Supplier Id 2.Manufact. Date 3.Serial number 4.Hardware number 5.Hardware vers. 6.Software number 7.Software vers. 8.License number 9.Vehicle speed

3.Speed test	1.Manual 2.Automatic

4.Odometer test
5.Read DTCS
6.Erase DTCS
7.Sensor pairing
8.Clock test
9.PIN code
10.Select Tacho.
11.Product info.
12.Language.

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3.2.7 Digital SE5000

DIGITAL SE5000

1.Measure W	1.Manual 2.Photo sensor	
2.Parameters	1.Calibration	1.W factor 2.K factor 3.L (Tyre Circ.) 4.Tyre Size 5.Max.Auth.Speed 6.Odometer 7.Time & Date 8.Next Cal. Date 9.Veh.Reg.Nation 10.Veh.Reg.Number 11.Veh.Id.Number 12.O/P shaft
	2.Other param.	1.ResetHeartbeat 2.TCO1 priority 3.O/P shaft 4.CAN rep.rate 5.Part number
	3.Specific	1.Part number 2.CanBus activat. 3.Speed Corr. 4.D6 5.D4 6.Light input 7.RPM input 8.Default lang. 9.Serial Output 10.D1D2 Record 11.RPM Record 12.Speed Record 13.Kn factor 14.Install. date 15.IMS Source 16.IMS Gain 17.IMS Factor
	4.Information	1.Supplier Id 2.Manufact. Date 3.Serial number 4.Hardware number 5.Hardware vers. 6.Software number

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		7.Software vers. 8.License number 9.Vehicle speed
3.Speed test	1.Manual 2.Automatic	
4.Odometer test		
5.Read DTCS		
6.Erase DTCS		
7.Sensor pairing		
8.Clock test		
9.PIN code		
10.Select Tacho.		
11.Product info.		
12.Language.		

3.2.8 Digital ACTIA

DIGITAL ACTIA

1.Measure W	1.Manual 2.Photo sensor	
2.Parameters	1.Calibration	1.W factor 2.K factor 3.L (Tyre Circ.) 4.Tyre Size 5.Max.Auth.Speed 6.Odometer 7.Time & Date 8.Next Cal. Date 9.Veh.Reg.Nation 10.Veh.Reg.Number 11.Veh.Id.Number 12.O/P shaft
	2.Other param.	1.ResetHeartbeat 2.TCO1 priority 3.O/P shaft 4.CAN rep.rate 5.Part number
	3.Specific	1.Default Lang 2.Card Language 3.Backlight conf. 4.Drv1 ign.ON 5.Drv2 ign.ON

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		6.Drv1 ign.OFF 7.Drv2 ign.OFF 8.Install. date
	4.Information	1.Supplier Id 2.Manufact. Date 3.Serial number 4.Hardware number 5.Hardware vers. 6.Software number 7.Software vers. 8.License number 9.Vehicle speed
3.Speed test	1.Manual 2.Automatic	
4.Odometer test		
5.Read DTCS		
6.Erase DTCS		
7.Sensor pairing		
8.Clock test		
9.PIN code		
10.Select Tacho.		
11.Product info.		
12.Language.		

3.2.9 Digital EFAS

DIGITAL EFAS

1.Measure W	1.Manual 2.Photo sensor	
2.Parameters	1.Calibration	1.W factor 2.K factor 3.L (Tyre Circ.) 4.Tyre Size 5.Max.Auth.Speed 6.Odometer 7.Time & Date 8.Next Cal. Date 9.Veh.Reg.Nation 10.Veh.Reg.Number 11.Veh.Id.Number 12.O/P shaft

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2.Other param.	1.ResetHeartbeat 2.TCO1 priority 3.O/P shaft 4.CAN rep.rate 5.Part number
3.Specific	1.CAN-A activat. 2.CAN-A tr.rate 3.CAN-A ID mode 4.CAN-A sample 5.CAN-A pro.tach 6.CAN-A pro.diag 7.Trip Reset 8.ExtSerial act. 9.ExtSerial prot 10.Illumination 11.Engine Speed 12.N Factor 13.EngSpdThreshold 14.SpeedThresholds 15.Lang.Handling 16.PrtLocalTimeEn 17.CAN-C activat. 18.CAN-C tr.rate 19.CAN-C ID mode 20.CAN-C sample 21.RemoteDataTrans 22.RepairShopCode 23.Tester Sn 24.Tester SW 25.IMS Source
4.Information	1.Supplier Id 2.Manufact. Date 3.Serial number 4.Hardware number 5.Hardware vers. 6.Software number 7.Software vers. 8.License number 9.Vehicle speed

3.Speed test	1.Manual 2.Automatic

4.Odometer test
5.Read DTCS
6.Erase DTCS
7.Sensor pairing
8.Clock test

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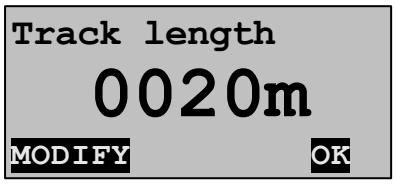
```
9.PIN code
10.Select Tacho.
11.Product info.
12.Language.
```

4 Functions description

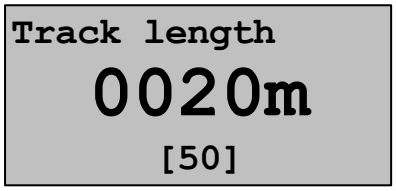
4.1 Measure W

4.1.1 Measure W - Manual



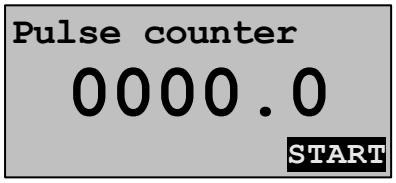
1. Check the track length.

Press F3 (OK) to go on, or press F1(MODIFY) to change the track length.



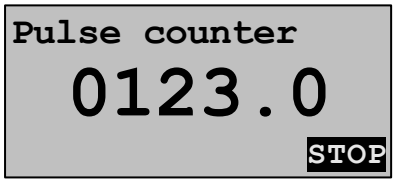
(optional)

to set the 'Track length', enter the new value and press 'Ent'.



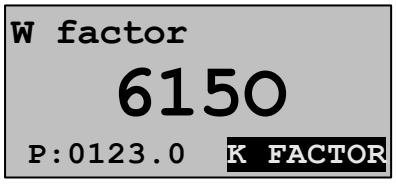
2. Press F3 (START) and drive the vehicule along the track.

The pulse count will start.

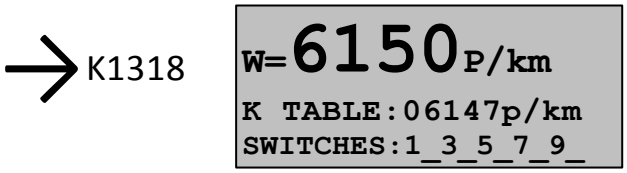


3. At the end of the track, press F3 (STOP).

The W factor will be calculated as a function of the pulse count and the track length.



4. Press F3 (K FACTOR) to access K factor setting.



5. The closest value from the K factor table of the 1318 is displayed with the corresponding switches

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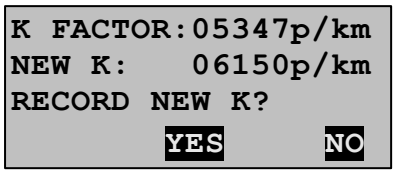
positions.

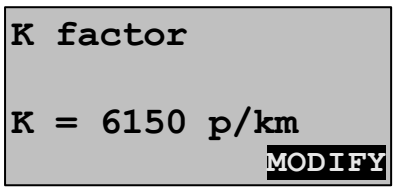
Press 'Esc' to go back to main menu.

Other tachographs



5. Present K factor will be read from the tachograph and displayed. 'NEW K' is the W factor that has been measured and should be recorded as the new K factor.

Press F2 (YES) to record it or F3 (NO) to leave it unchanged.

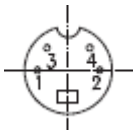


6. If 'YES' has been selected previously, the new K factor will be read back from the tachograph.

This factor can modified manually if required pressing F3 (MODIFY).

4.1.2 Measure W - Photo sensor

The W measure with a photosensor is exactly the same as in manual mode, except that the 'START' and 'STOP' pulses are generated by the sensor. In photo sensor mode, the 'F3' (START & STOP) will not be active.
You can connect any photo sensor using a MiniDIN 4-pins connector connected to the left connector of the CD400.



- Shielding: Ground (GND 0V).
- Pin n°2: photo sensor signal (the signal should be low when the reference object/reflector is not detected).

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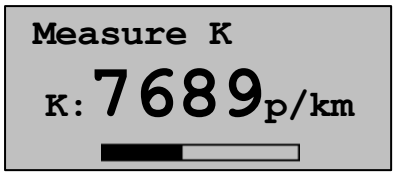
4.2 Measure K

This function is available only for the K1314/1318 and the FTCO 1319.



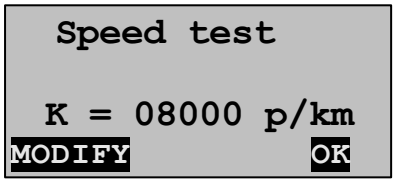
Measuring the K factor takes a few seconds.
The value is updated every time the progress bar is completed.

4.3 Parameters

The parameter list is available at: Menu trees

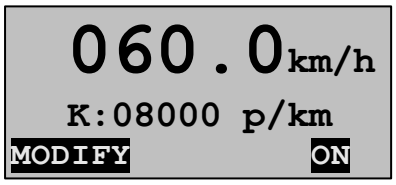
4.4 Speed test

4.4.1 Speed test - Manual



For the K1314/1318 the K reference is set to the last K measured if available, otherwize it is set to 8000. For the other tachographs the K reference is set to the K factor programmed in the tachograph.

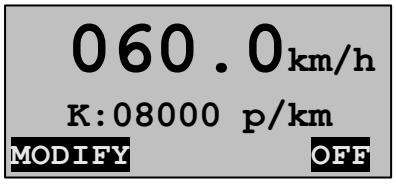
If required, the K reference can be adjusted manually pressing 'F1' (MODIFY).



By default the speed is set to 60 km/h.

Press F1 (ON/OFF) to start/stop speed simulation.

The text "km/h" is blinking when the speed is currently simulated.



Pressing the '↑' and '↓' keys, will increase/decrease the speed by 1km/h steps.

Pressing the '←' and '→' keys, will increase/decrease the speed by 0.1km/h steps.

Press F1(MODIFY) to insert a new speed value.

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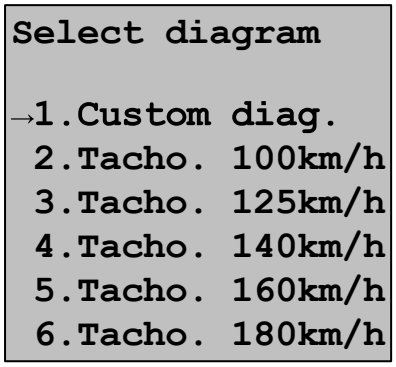
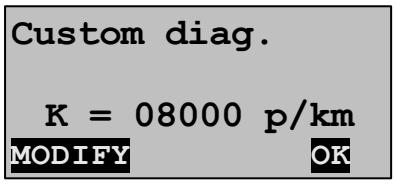
4.4.2 Speed test - Automatic

Select diagram



Select the speed diagram to be executed and press 'Ent'.

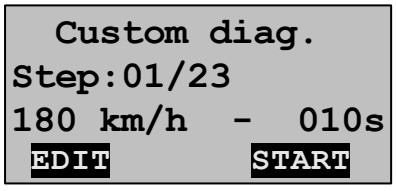


For the K1314/1318 the K reference is set to the last K measured if available, otherwize it is set to 8000.

For the other tachographs the K reference is set to the K factor programmed in the tachograph.

If required, the K reference can be adjusted manually pressing 'F1' (MODIFY).

Press 'F3' (OK) if you agree with the K factor value.



Using the '↑' and '↓' keys, '←' you can check the speed and duration of each step of the automatic test.

Press 'F3' (START) to start the test.

The 'EDIT' funtion (F1) is available only for the custom diagram to edit the speed and duration of current step of the automatic test. The automatic test will end at the first step at which the duration is set to zero.

[START] -> run automatic speed test

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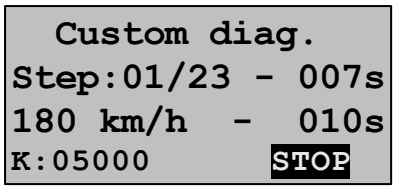
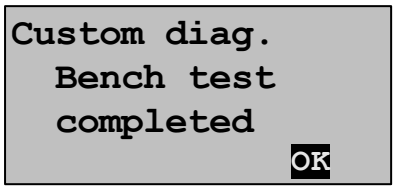


A count down will show the time left for present step.
Press 'F3' (STOP) to stop the bench test



Bench test completed.
Press 'F3' (OK) to go back to the menu.

[EDIT] -> Edit custom diagram

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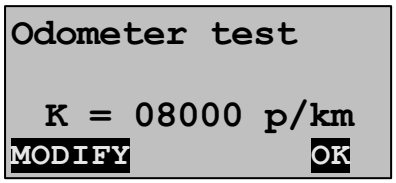
4.5 Odometer test

The programmer will automatically simulate a speed of 50km/h on 1000m distance and check if the odometer as been incremented by 1000m.

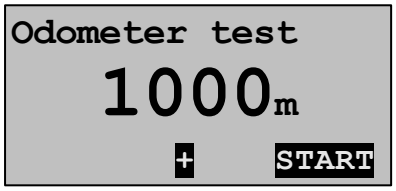


For the K1314/1318 the K reference is set to the last K measured if available, otherwize it is set to 8000.

For the other tachographs the K reference is set to the K factor programmed in the tachograph.

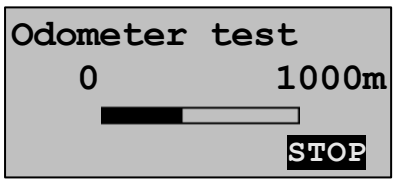
If required, the K reference can be adjusted manually pressing 'F1' (MODIFY).

KTCO1318/FTCO1319/EGK100



Press 'F2' to adjust the position of the start point.

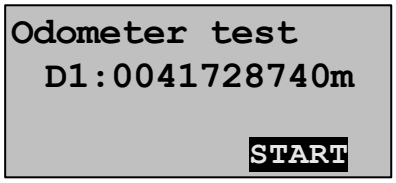
Press 'F3' (START) to start the test.



Wait until the progress bar is completed.

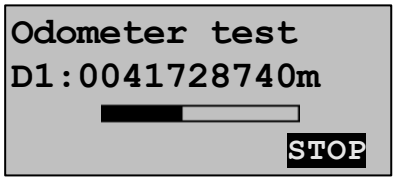
The test can be aborted pressing 'F3' (STOP).

MTCO/VR2400/DIGITAL



The initial value of the odometer (D1) will be read.

Press 'F3' (START) to start the test.



Wait until the progress bar is completed.

The test can be aborted pressing 'F3' (STOP).

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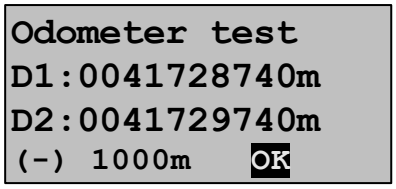
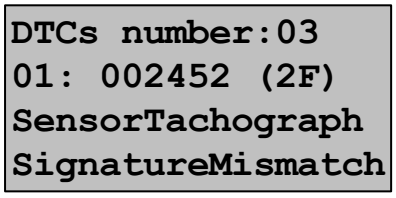


At the end of the test, the final odometer value will be read (D2). The difference between D2 and D1 will be calculated (D2-D1). If the difference equals 1000m, the test has been successful.

4.6 Read DTCs

The function "Read DTCs" is used to read the "Diagnostic Trouble Codes" (DTC) stored in the error memory of the tachograph.

It is available for the following tachographs:
- Digital tachographs (DTCO1381, SE5000, SmarTach & EFAS)



DTCs number is the error number available in memory
Error code
Full error description

Use the '↑' and '↓' keys to select next or previous error.
Press 'Esc' to go back to main menu.

4.7 Erase DTCs

The function "Erase DTCs" is used to erase the "Diagnostic Trouble Codes" (DTC) stored in the error memory of the tachograph.

It is available for the following tachographs:
- MTCO 1324/1390
- VR2400
- Digital tachographs (DTCO1381, SE5000, SmarTach & EFAS)

The following message is displayed after erasing the error memory.

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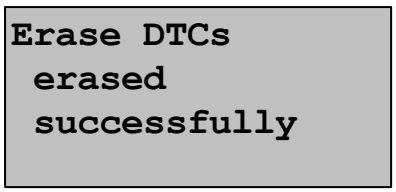
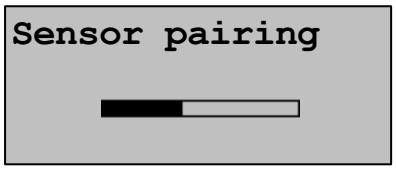


Press 'Esc' to go back to main menu.

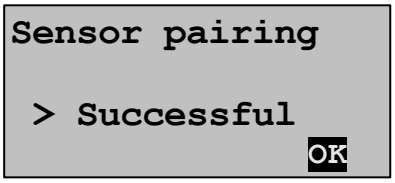
4.8 Sensor Pairing (Kitas activation)

This function is available for the following tachographs:

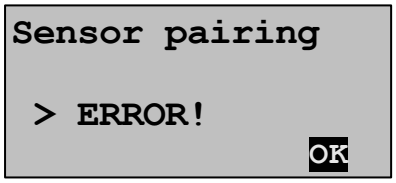
- MTCO 1324/1390
- VR2400
- Digital tachographs (DTCO1381, SE5000, SmarTach & EFAS)



A progress bar indicates the status of KITAS activation.



Kistas sensor is activated with success.



No response received from KITAS.

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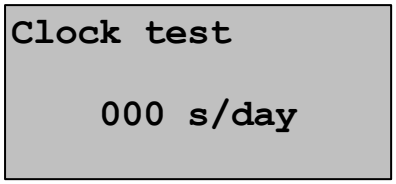
4.9 Clock test

The clock test function will check the accuracy of the clock of the tachograph.
For the K1314, the K1318 and the k1319, an external clock sensor has to be used.

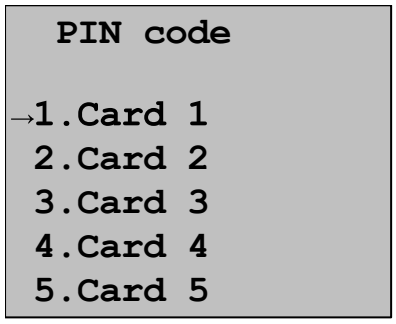


The measure is updated every second.
The result represents the clock deviation in seconds/day.
Press 'Esc' to go back to main menu.

4.10 PIN code

The "PIN code" function permits to send the workshop card PIN code to the tachograph automatically.

This function is available for the Digital tachographs (DTCO1381, SE5000 & EFAS).

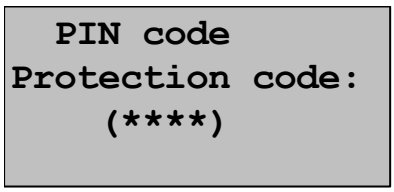


Select the workshop card ID in the list (ie: name of owner) and press 'Ent'.

Press F1(MODIFY) to modify the data (card name, PIN code & protection code).

Press F3(Ok) to send the code.

OK →



Enter the protection code and press 'Ent'

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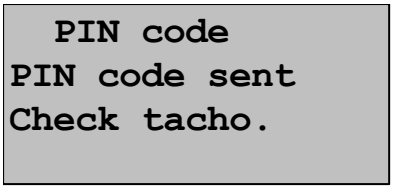
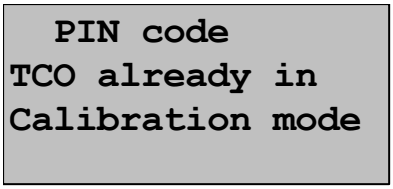
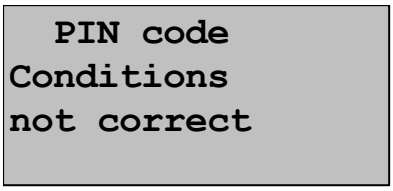


Response 1.
PIN code has been sent.
Check Tachograph.

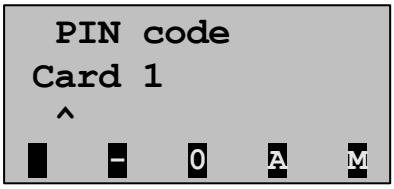


Response 2.
The tachograph is already in calibration mode.
No PIN code required.



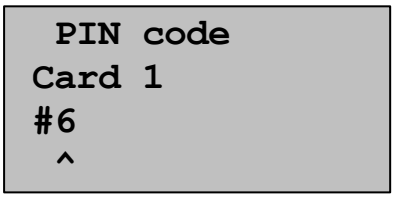
Response 3.
The tachograph is not ready to receive the PIN code (i.e. no card inserted).

MODIFY
→

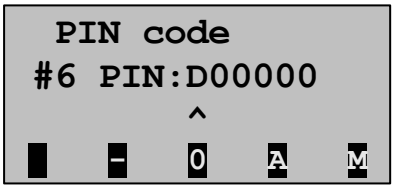


Edit the card id.

Select the digit using the '←' & '→' keys and set the digit value using the '↑' & '↓' keys. Then press 'Ent'.

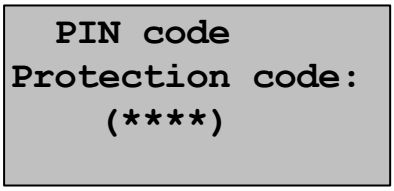


Adjust the PIN code length using the '↑' and '↓' keys and press 'Ent'.



Edit the PIN code.

Select the digit using the '←' & '→' keys and set the digit value using the '↑' & '↓' keys. Then press 'Ent'.



Enter a protection code which will be required to be able to send the PIN code.

The code can be from 1 to 4 digits long or can be left blank if not necessary.

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4.11 Select tachograph

```
 Select Tacho.
→1.KTCO 1314/1318
 2.MTCO1324/1390
 3.Motomet.EGK100
 4.Kienzle 1319
 5.V.Root VR2400
 6.Digital VDO
 7.Digital SE5000
 8.Digital Actia
 9.Digital EFAS
```

The tachograph type is detected automatically on power ON, but if for any reason, another type has to be selected, this can be done manually.

Select the tachograph type in the menu and press 'Ent'.

4.12 Product info

Shows software version and serial number.

```
CD400 Programmer
 Sn: 56000010
 SW: V2.0 r07
 www.cdconcept.be
```

4.13 Language

Select the language in the menu and press 'Ent'.

```
    Language
→1.English
 2.Deutsch
 3.Español
 4.Français
 5.Nederlands
 6.Português
 7.Turkish
 8.Romanian
 9.Russian
```

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5 Software upgrade

5.1 Release notes

27/12/2012: CD400 V2.0 r07 b10:
- New parameters for DTCO1381: IMS Activation, IMS Source, IMS Factor, VDO Counter
- New parameters for SE5000: IMS Source, IMS Gain, IMS Factor
- New parameters for EFAS: IMS Source

12/06/2012: CD400 V2.0 r06:
- Automatic sensor pairing has been removed for the DTCO1381.

02/05/2012: CD400 V2.0 r05:
- New photo sensor test function.

13/03/2012: CD400 V2.0 r04:
- Clock test calculation error corrected.
- Clock test can be calibrated.

12/12/2011: CD400 V2.0 r03:
New W measure methods:
- Rolling road.
- Constand speed.
- Odometer.

07/04/2011: CD400 V2.0 r02:
- Function titles problem solved.
- Test clock stability and accuracy improved.

08/12/2010: CD400 V2.0 r01:
- Addition of serbian language
- Addition of 'Ä','Ü' & 'Ö' characters in string parameters
- New parameter for the MTCO1324/1390: Serial number (Read only)
- New parameters for DTCO1381: PartNumber, InstallationDate
- New parameters for SE5000: PartNumber, InstallationDate
- New parameter for SmarTach: InstallationDate
- New parameters for EFAS: PartNumber
- EFAS: Automatic resets after canbus parameter setup
- K1319: implementation of all parameters (total of 27)
- Completion of turkish language
- A "Work status" test has been added after the automatic speed test.
- New parameters for DTCO1381: remote download parameters.
- PIN code entry function.

Known problem: Wrong function titles

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09/11/2009: CD400 V2.0 (First homologated version)
Known bug: - Custom speed diagrams can not be longer than 16 steps otherwise some important data can be corrupted.

5.2 Upgrade procedure

1. Download and install the CD200-ISP software: setup-CD200-ISP-V1-2.zip
2. Connect the CD400 to the serial port of your PC using the upgrade cable (CA-RS232-1).
3. Start the CD200-ISP software.
4. Select the COM port.
5. Select the .hex file.
6. Click on the "Program" button.
7. Switch the CD400 power ON using a tachograph, a DC adapter (9V to 30V), or the internal 9V battery.
8. Wait until the progress bar is completed.

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